

New Architecture for the Future Internet

Arjan Duresi

School of Science

Indiana University – Purdue University Indianapolis

Abstract

The Internet is one of the most successful technological achievements of our time. The Internet mirrors and enhances all aspects of your lives, by creating unprecedented opportunities for advancing knowledge in all fields of human activities. However, the 21st century society's needs may not be met by the current trajectory of incremental changes to the current Internet. Therefore, the research community worldwide, well supported by corresponding funding agencies, is engaged in exploring new architectures for the future Internet.

We are working on one of the collaborative projects to design a new Internet architecture. Our larger team includes multidisciplinary expertise of researchers from US and the world, from institutions such as Washington University in Saint Louis, Purdue University, Seikei University in Tokyo Japan, and Technical University of Catalonia Spain. Our research in this field focuses on various major requirements of the future Internet, including security, resilience, mobility, better manageability, economic viability and suitability for the needs of society.

The today's Internet is marked by a number of serious security issues, including weak defenses against attacks on hosts, attacks that attempt to disrupt communications, attacks on availability (Denial of Service attacks), and attacks on the proper operation of applications. We are exploring approaches that will bring to the Internet concepts that have evolved in real life security. For example, in real life we use satisfying personal authentication mechanisms; our society's security is based on a strong legal system, various complementary agencies, compartmental division of tasks, including national borders and so on. Most of such concepts do not apply to the Internet today. Furthermore, the existing Internet architecture not only does not provide sufficient security, but worst, it empowers the attacking activities. We propose drastic changes, starting with strong authentication, and implementation of various layers of security, that will make the Internet a much more trustworthy and resilient system.

The future Internet will be composed mostly of mobile nodes such as cell phones, PDAs, various types of sensors, and so on. Unfortunately, today's Internet is not equipped for mobility. We are exploring solutions that provide mobility service as an interplay among technical and economic factors. The practice has shown that many sound technical solutions have failed because of the lack of economic viability. Therefore, we extend the tradeoff among technical and economic aspects to all future Internet services. Furthermore, our architecture is policy based and its management is business oriented. Our architecture is flexible and open to future needs of society.

This project is currently partially funded by NSF. We are looking forward to expand our collaborations and partnership in this research field.